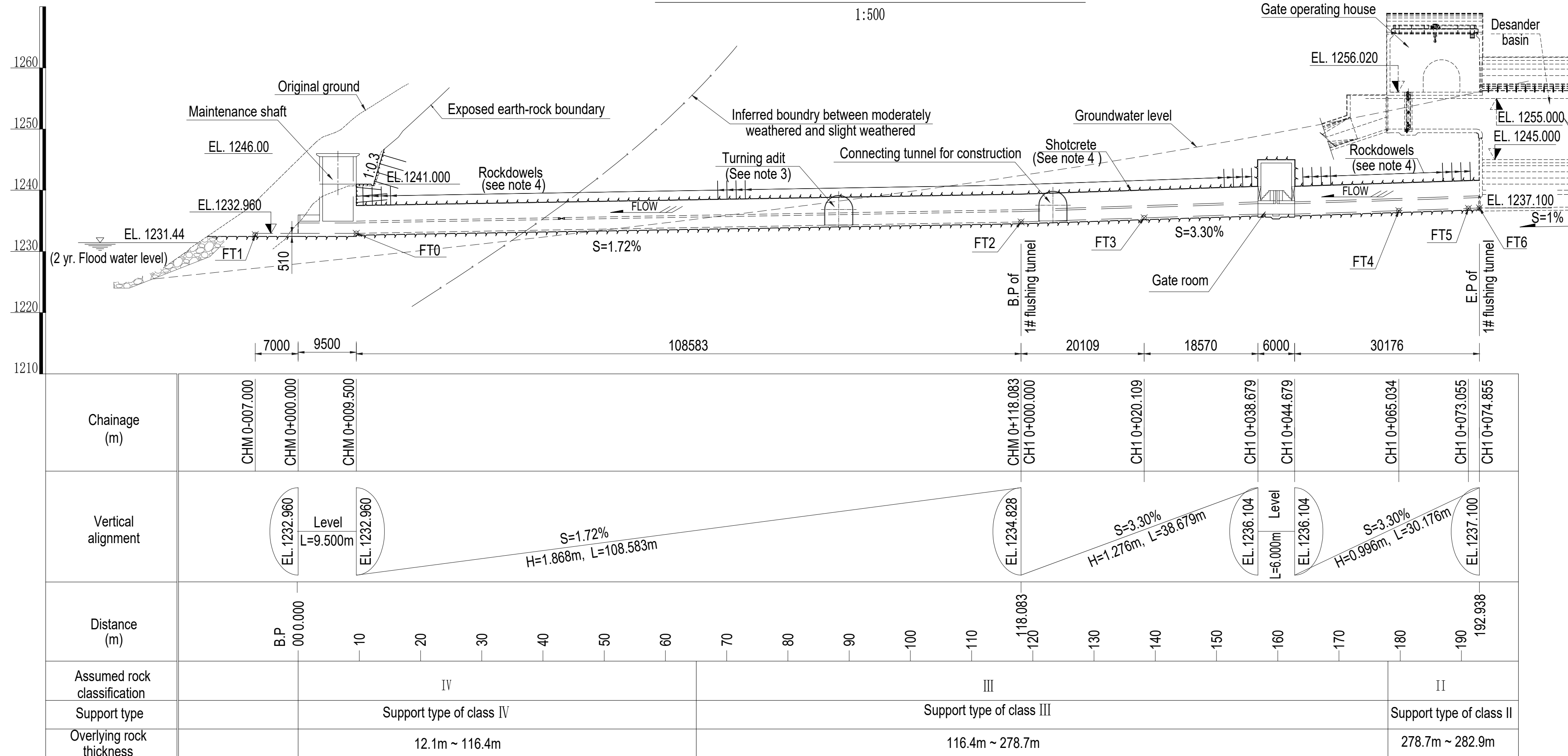


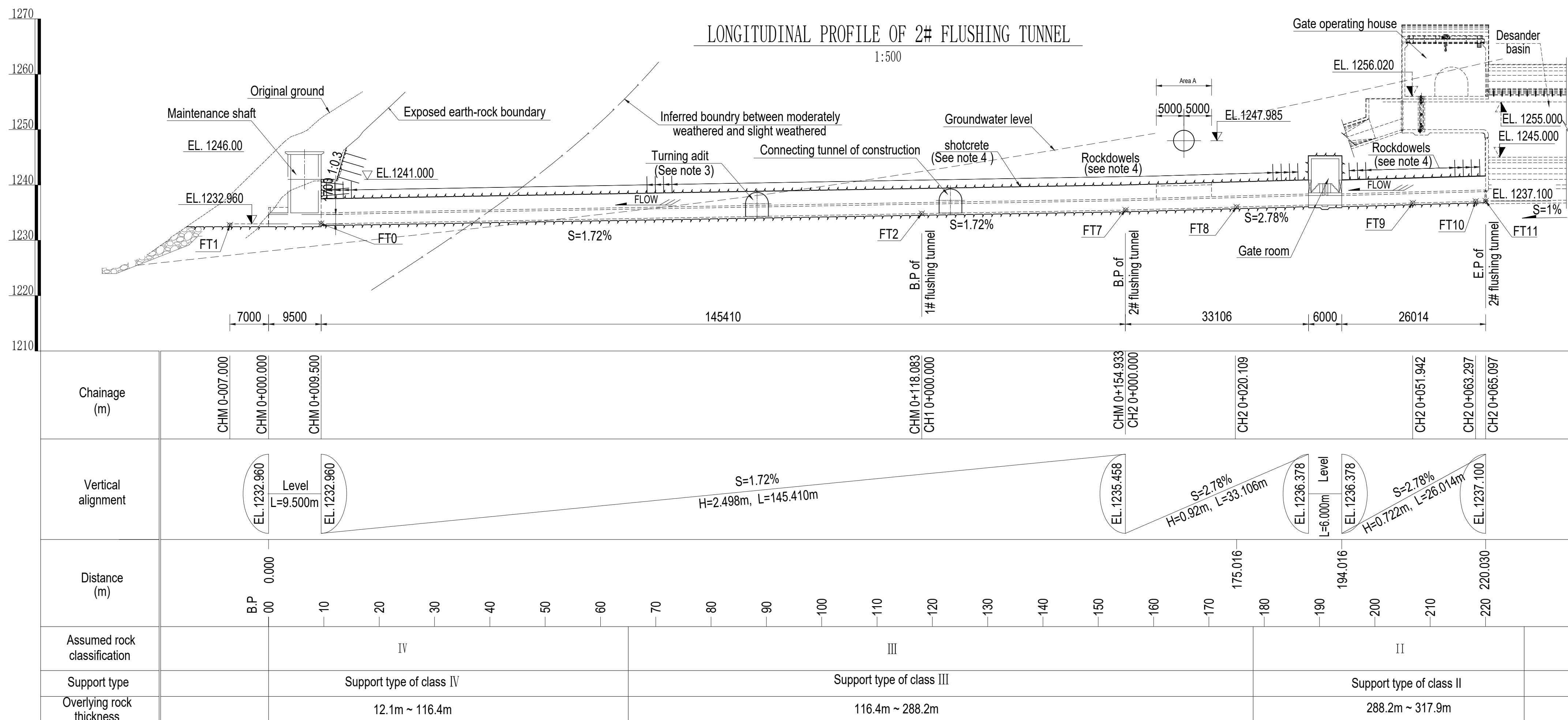
LONGITUDINAL PROFILE OF 1# FLUSHING TUNNEL

1:500



LONGITUDINAL PROFILE OF 2# FLUSHING TUNNEL

1:500



NOTE

- All dimensions are in millimeters, and coordinates, chainages & elevations are in meters.
- Pls. see LAYOUT DRAWING OF FLUSHING TUNNEL (dwg. No.: UT1-C-030-CVL-DG-53001) for control points coordination and chainages.
- Numbers & location of turning adit are subjected to construct ability & geological condition.
- According to geological conditions of the location, the length and arrangement of rockdowels, and the thickness of shotcrete all are different, pls. see sheet 4 & sheet 5 for detail.
- Symbol description:
A-Line is the design excavation line.
B-Line is the overbreak line.
R-denotes round bar, yield strength of the round bar is 280MPa.
D-denotes deformed bar, yield strength of the deformed bar is 500MPa.
- The cylinder specified compressive strength of shotcrete at 28 days of age is 21MPa.
- The specified compressive strength of concrete is the cylinder strength at age of 28 days.

Legend:

- Inferred boundary between moderately weathered and slight weathered
- Excavation line
- Inferred ground water level
- surface of 1st stage concrete
- section of 1st stage concrete, $f_c=24\text{MPa}$
- section of 1st stage concrete, $f_c=16\text{MPa}$
- section of plastic fiber shotcrete

Scale:

1:500 0 5 10 15 20 25m

REFERENCE DRAWINGS

UT1-C-030-CVL-DG-53001	SURROUNDING ROCK STABILITY CALCULATION OF FLUSHING TUNNEL
UT1-C-030-CVL-DG-51002	EXCAVATION AND SUPPORT DRAWING OF ACCESS TUNNEL FOR D/S GATE OPERATING HOUSE OF DESANDER BASIN
UT1-C-030-CVL-DG-52002	EXCAVATION AND SUPPORT DRAWING OF DESANDER BASIN
UT1-C-030-CUL-DG-52001	LAYOUT DRAWING OF DESANDER BASIN
UT1-C-030-CUL-DG-51001	LAYOUT DRAWING OF ACCESS TUNNEL FOR D/S GATE OPERATING HOUSE OF DESANDER BASIN

SYMBOL AND LEGEND

FOR APPROVAL

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PROJECT TITLE

Upper Trishuli-1 HEP (216MW)

OWNER



OWNER'S ENGINEER



CONTRACTOR

DOOSAN Enerbility

DRAWING TITLE

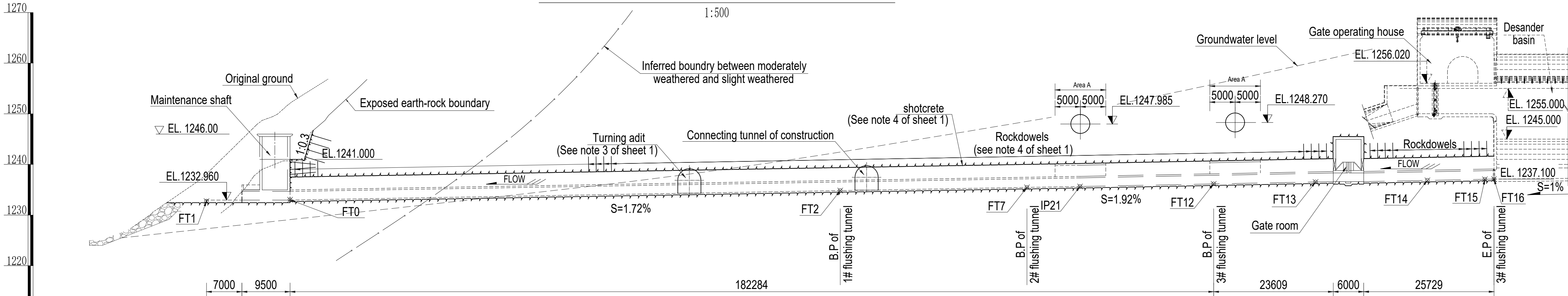
EXCAVATION AND SUPPORT DRAWING OF FLUSHING TUNNEL

INDEX	DRAWING NUMBER	SHEET NO.	REV. NO.
A	UT1-C-030-CVL-DG-53002-01	1 of 7	OB

A1 (594 x 841 MM) 1

LONGITUDINAL PROFILE OF 3# FLUSHING TUNNEL

1:500



Chainage (m)	CHM 0+007.000	CHM 0+000.000	CHM 0+009.500													CHM 0+118.083 CH1 0+000.000			CHM 0+154.933 CH2 0+000.000			CPH 0+191.930 CH3 0+000.000			CH3 0+020.109 CH3 0+023.608	CH3 0+029.608			CH3 0+042.183			CH3 0+053.538 CH3 0+055.338					
Vertical alignment																																					
Distance (m)	B.P	00	10	20	30	40	50	60	70	80	90	100	110	118.230	120	130	140	150	155.068	160	170	180	190	191.930	200	210	212.039	E.P	215.539	220	221.539	230	234.113	240	245.468	247.268	250
Assumed rock classification	IV												III												II												
Support type	Support type of class IV												Support type of class III												Support type of class II												
Overlying rock thickness	12.1m ~ 116.4m												116.4m ~ 294.4m												294.4m ~ 352.9m												

TUNNEL SUPPORT PATTERN

Rock mass quality	40≥Q	10≤Q<40	4≤Q<10	1≤Q<4		Q<1
Support type	I	II	III	IV (Without steel support)	IV (With steel support)	V Same as type IV(With steel support)
Inner dimension(m)	W=3.4m, H=4.2m					
	Excavation Parameter					
ESR	1.3	1.3	1.3	1.3		1.3
Excavation span(m)	3	3	2	1.5		0.5~1
Calculated MUS*(m)	11	9	5	3		1
MUS* for shotcrete application(m)		9	2	1.5		1
MUS* for rock dowel installation(m)		6	4	3		0.5~1
MUS* for steel support installation(m)					0.5~1.0	0.5~1
Excavation method	Blasting			Blasting/mechanically		Mechanically
Initial support parameters						
Weep hole, Φ50mm,L=0.3m	where necessary					
Plastic fiber shotcrete,f _c =25MPa	Spot	T=50mm	T=80mm	T=100mm	T=160mm	For class V rock, the same support scheme as class IV rock can be adopted after grouting is used to improve the integrity and firmness of surrounding rock.
Rock dowel, D25,L=3m,alternately	Spot	Spot	@2m×2m	@1.5m×1.5m	@1m×1m	
Steel support, MB150 (or lattice girder)					where necessary	
Forepoling grouted dowel,D25mm, @400mm, L=6m					where necessary	
*MUS , Maximum Unsupported Span.						

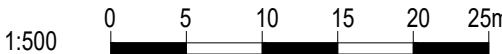
NOTE

- This set of drawings are excavation and support of flushing tunnel.
- All dimensions are in millimeters, and coordinates, chainages & elevations are in meters.
- Pls. see sheet 1 for other notes.

Legend:

- Inferred boundry between moderately weathered and slight weathered
- Excavation line
- Inferred ground water level
- surface of 1st stage concrete
- section of 1st stage concrete, f_c=24Mpa
- section of 1st stage concrete, f_c=16Mpa
- section of plastic fiber shotcrete

Scale:



REFERENCE DRAWINGS

UT1-C-030-CVL-DG-53001	SURROUNDING ROCK STABILITY CALCULATION OF FLUSHING TUNNEL
UT1-C-030-CVL-DG-51002	EXCAVATION AND SUPPORT DRAWING OF ACCESS TUNNEL FOR D/S GATE OPERATING HOUSE OF DESANDER BASIN
UT1-C-030-CVL-DG-52002	EXCAVATION AND SUPPORT DRAWING OF DESANDER BASIN
UT1-C-030-CUL-DG-52001	LAYOUT DRAWING OF DESANDER BASIN
UT1-C-030-CUL-DG-51001	LAYOUT DRAWING OF ACCESS TUNNEL FOR D/S GATE OPERATING HOUSE OF DESANDER BASIN

SYMBOL AND LEGEND

FOR APPROVAL

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OB	02.MAY., 2022	SECOND ISSUE	ZHANG KAI	ZHANG J.Q.	LI W.G.
OA	13.AUG., 2021	FIRST ISSUE	WANG H.Q.	ZHANG J.Q.	LI W.G.

PROJECT TITLE

Upper Trishuli-1 HEP (216MW)

OWNER



OWNER'S ENGINEER



CONTRACTOR

DOOSAN Enerbility

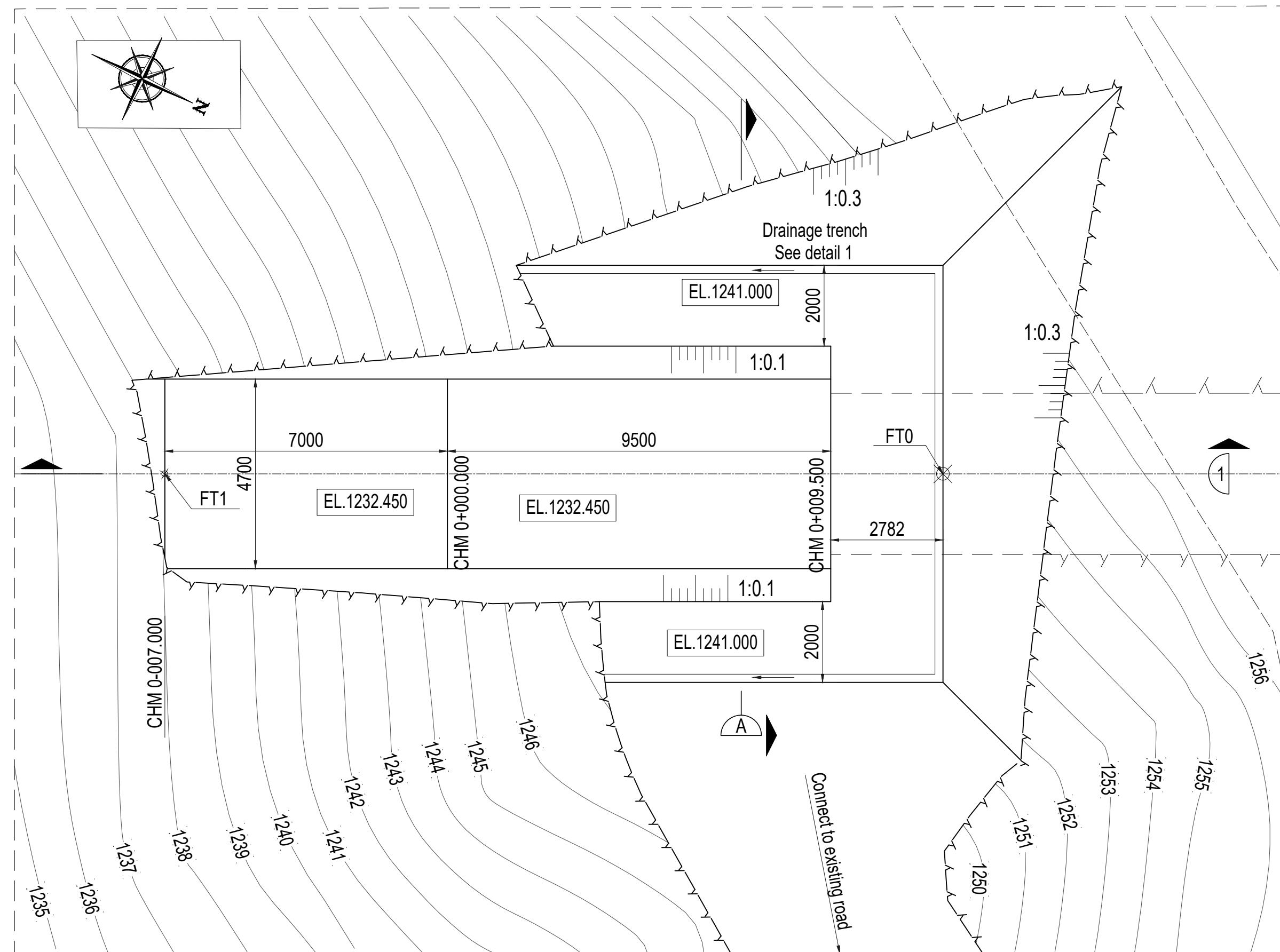
DRAWING TITLE

EXCAVATION AND SURPORT DRAWING OF FLUSHING TUNNEL

INDEX	DRAWING NUMBER	SHEET NO.	REV. NO.
A	UT1-C-030-CVL-DG-53002-02	2 OF 7	OB

A1 (594 x 841 MM) 1

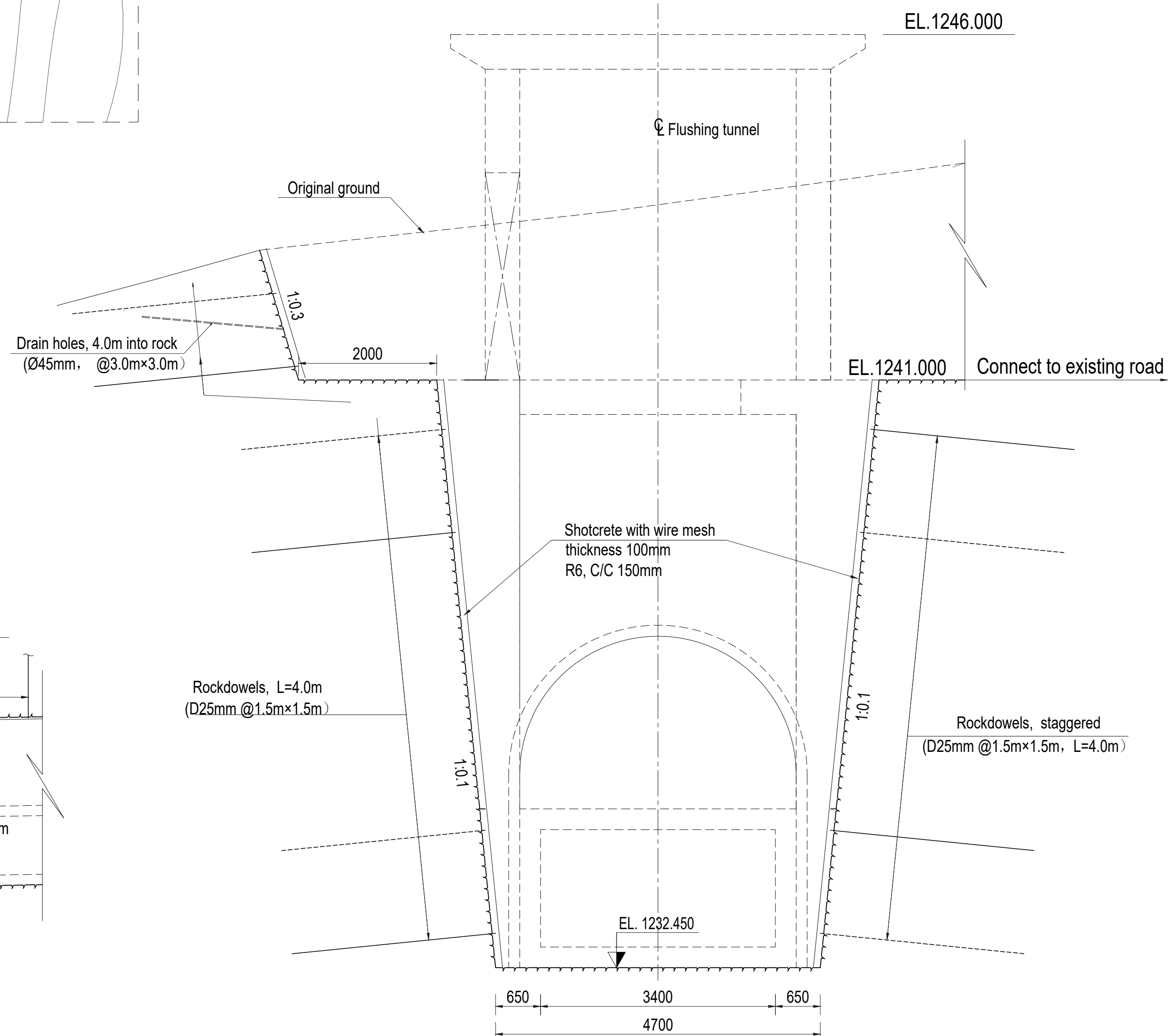
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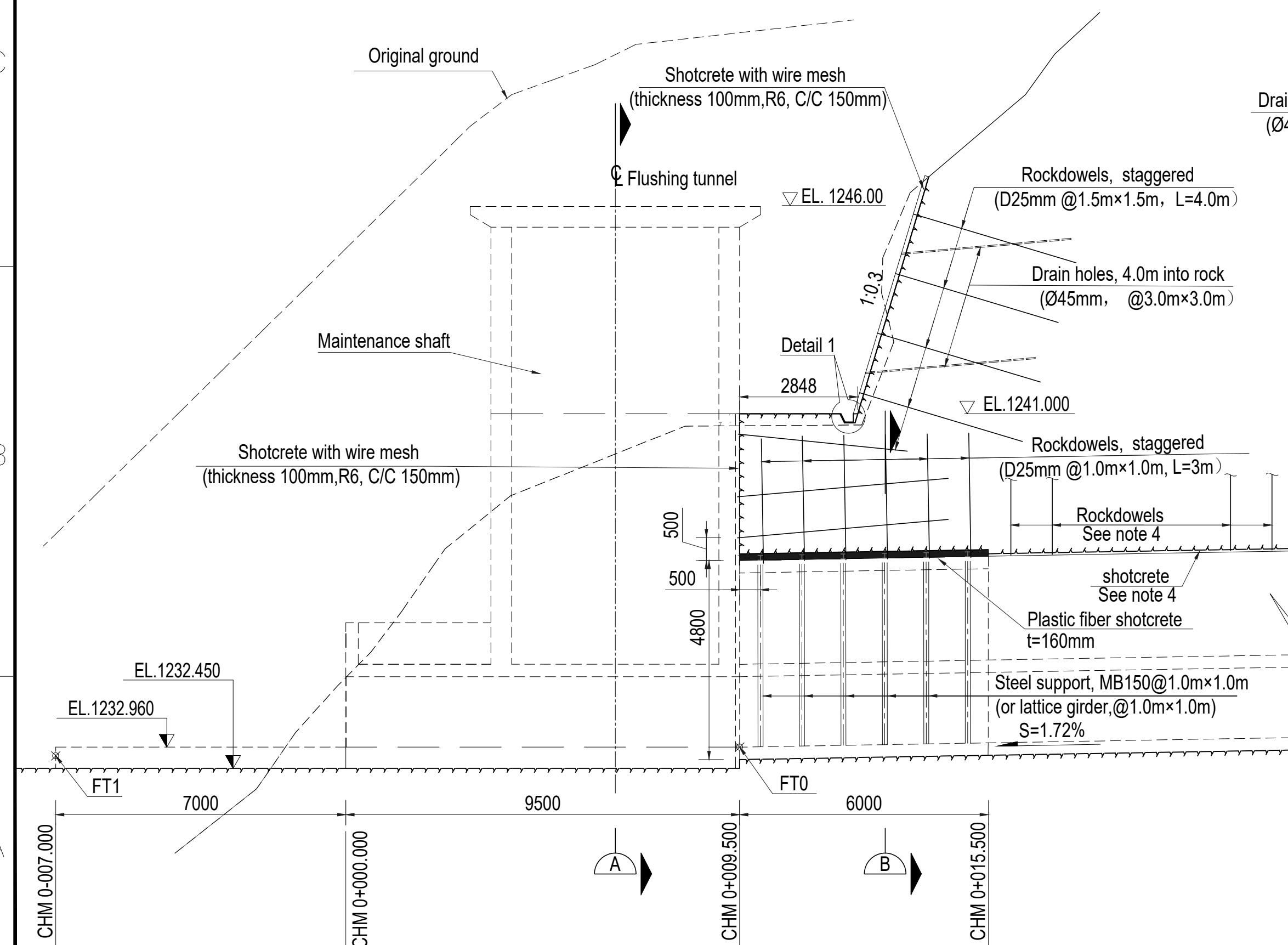
Q)	Y(E)	Z(Level)
----	------	----------

Point No.	X(N) (m)	Y(E) (m)	Z(Level) (m)	Remark
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FT0	3112221.668	627221.533	1232.960	

1:50



1:100

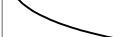
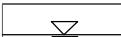
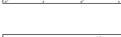


NOTE: The number and distance of the steel ribs shall be determined by the site geological conditions.

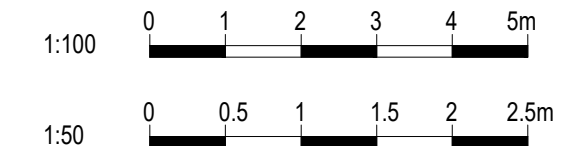
NOTE

1. This set of drawings are excavation and support of flushing tunnel.
2. All dimensions are in millimeters, and coordinates, chainages & elevations are in meters.
3. The steel support (or lattice girder) to rock class IIIb/IV is subjected to the exposed geological condition.
4. See sheet 5 for Section B-B.

Legend:

- | | |
|---|---|
|  | Inferred boundary between moderately weathered and slight weathered |
|  | Excavation line |
|  | Inferred ground water level |
|  | surface of 1st stage concrete |
|  | section of 1st stage concrete, $f'_c=24\text{Mpa}$ |
|  | section of 1st stage concrete, $f'_c=16\text{Mpa}$ |
|  | section of plastic fiber shotcrete |

Scale:



VL-DG-53001	SURROUNDING ROCK STABILITY CALCUL FLUSHING TUNNEL
-------------	--

UT1-C-030-CVL-DG-53001	SURROUNDING ROCK STABILITY CALCULATION OF FLOODING TUNNEL
UT1-C-030-CVL-DG-51002	EXCAVATION AND SUPPORT DRAWING OF ACCESS TUNNEL FOR D/S GATE OPERATING HOUSE OF DESANDER BASIN
UT1-C-030-CVL-DG-52002	EXCAVATION AND SUPPORT DRAWING OF DESANDER BASIN
UT1-C-030-CUL-DG-52001	LAYOUT DRAWING OF DESANDER BASIN
UT1-C-030-CUL-DG-51001	LAYOUT DRAWING OF ACCESS TUNNEL FOR D/S GATE OPERATING HOUSE OF DESANDER BASIN

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0A	13.AUG., 2021	FIRST ISSUE	WANG H.Q.	ZHANG J.Q.	LJ W.C. LJ Y.Z.
REV. NO.	DATE	DESCRIPTION	DRAWN	CHKD.	APPD.

PROJECT TITLE

Upper Trishuli-1 HEP (216MW)

OWNER



OWNER'S ENGINEER



CONTRACTOR

DOOSAN Enerbility

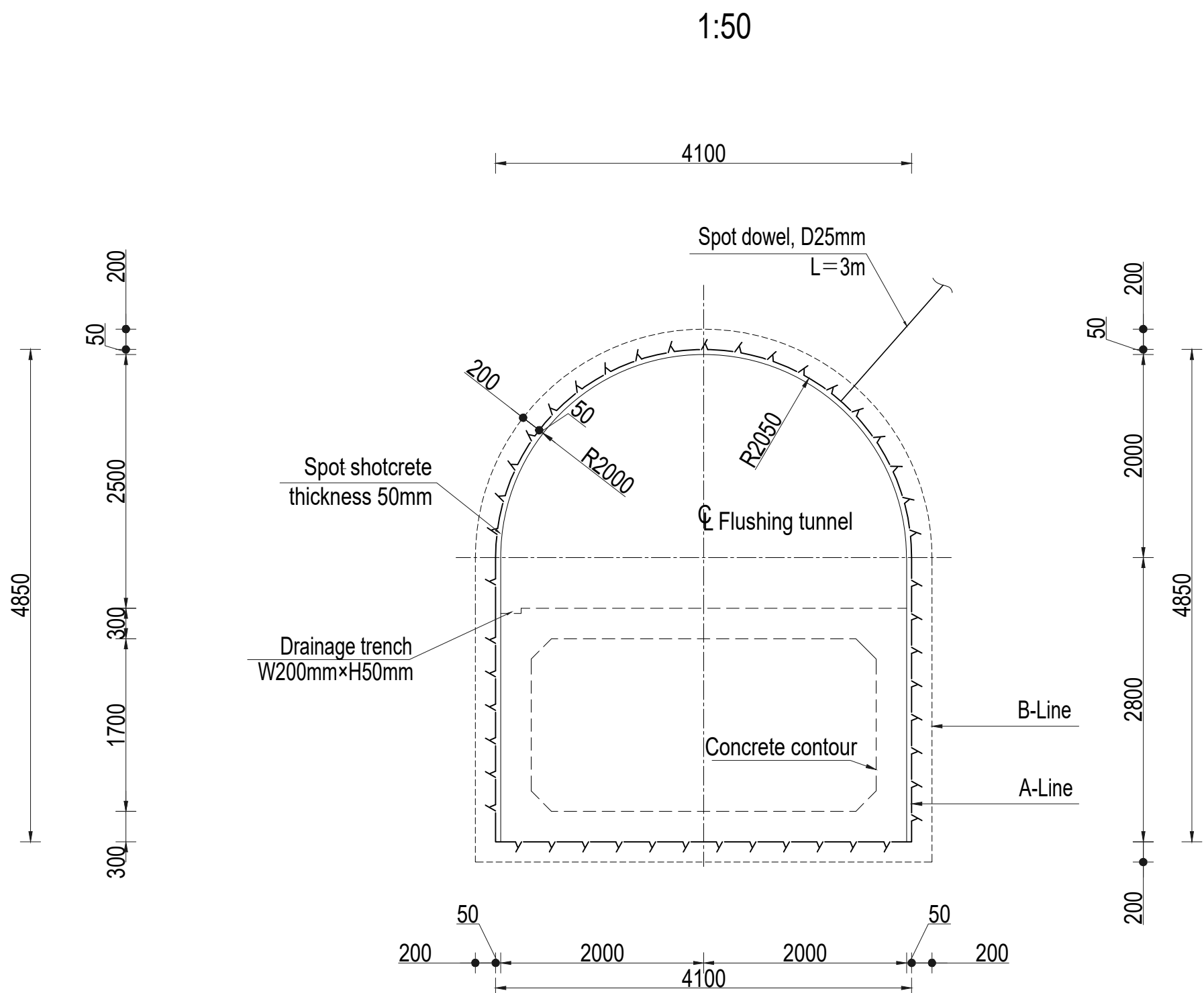
DRAWING TITLE

EXCAVATION AND SURPORT DRAWING OF FLUSHING TUNNEL

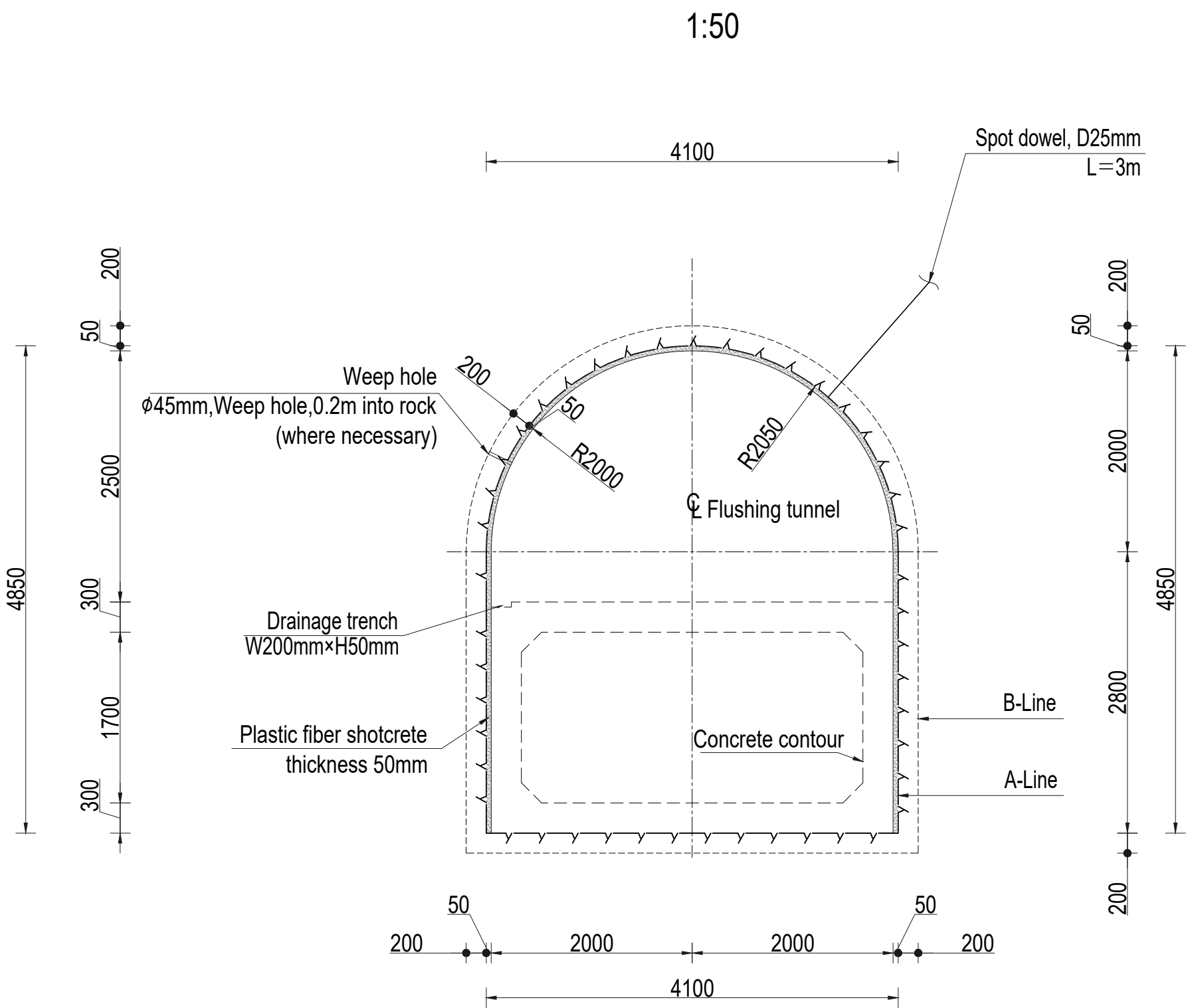
INDEX	DRAWING NUMBER	SHEET NO.	REV. NO.
A	UT1-C-030-CVL-DG-53002-03	3 OF 7	0B

A1 (594 x 841 MM) 1

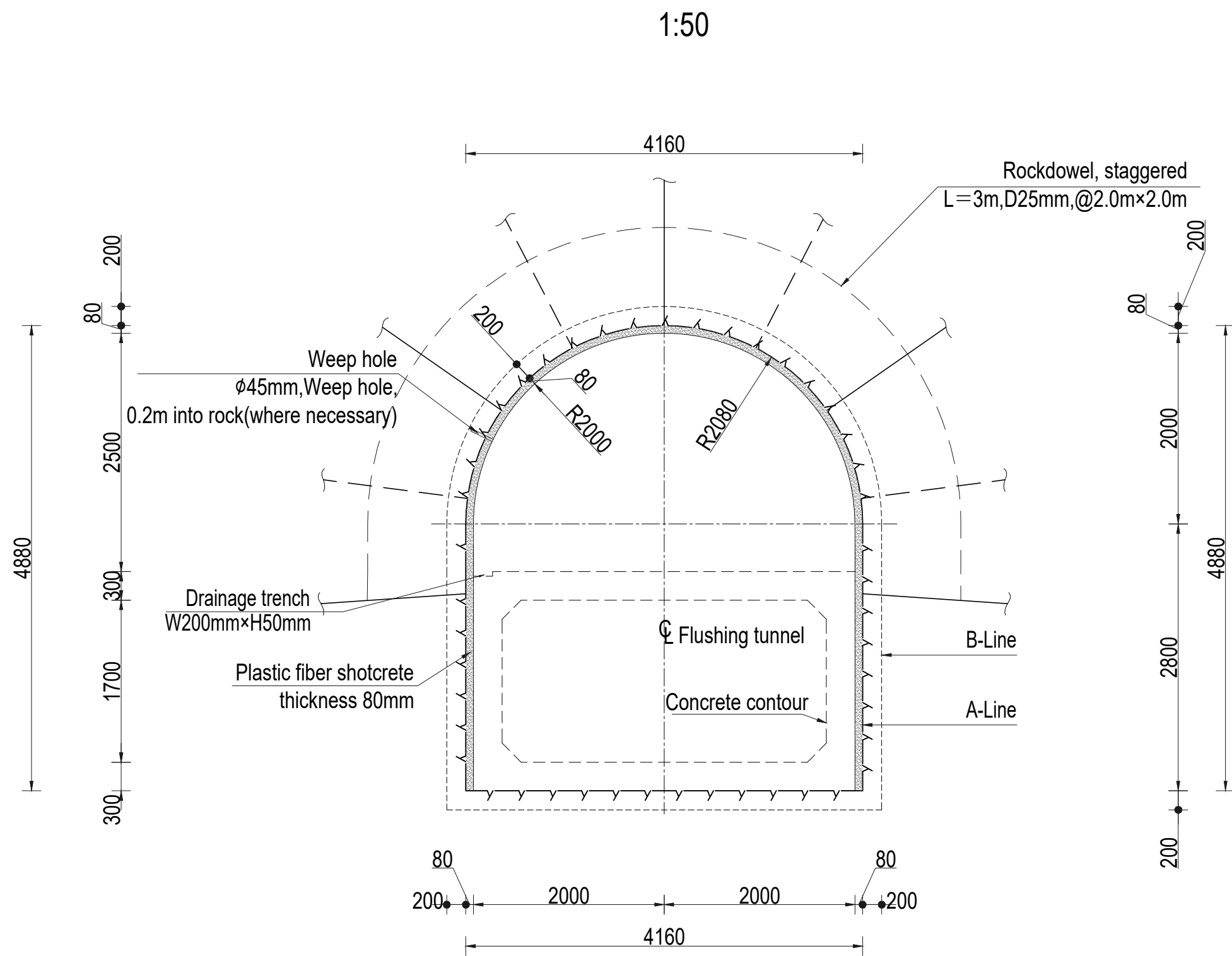
SUPPORT TYPE OF ROCK CLASS I



SUPPORT TYPE OF ROCK CLASS II

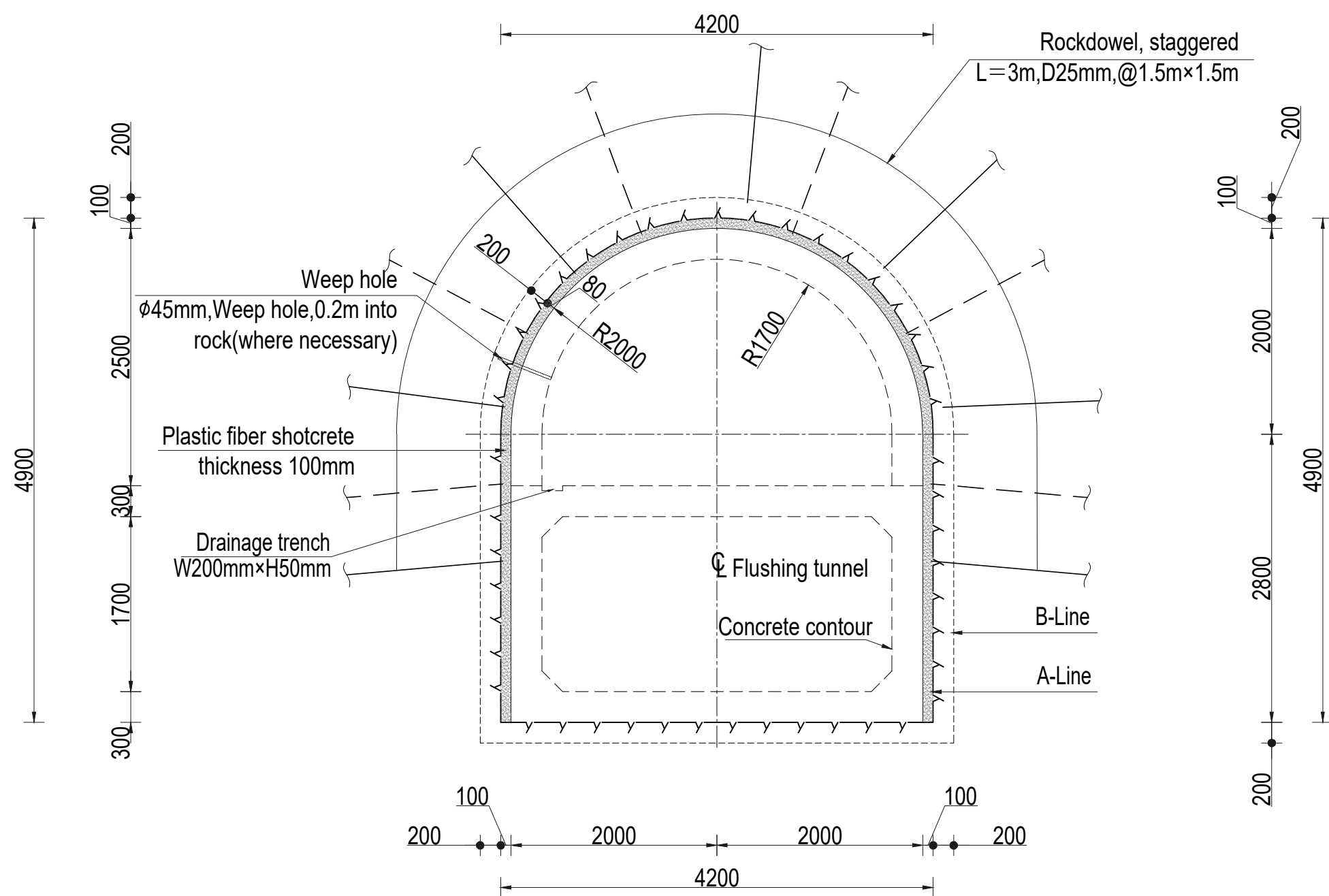


SUPPORT TYPE OF ROCK CLASS III



SUPPORT TYPE OF ROCK CLASS IV

(WITHOUT STEEL SUPPORT) 1:50



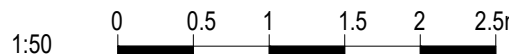
NOTE

1. This set of drawings are the excavation and support of flushing tunnel.
2. All dimensions are in millimeters, and coordinates, chainages & elevations are in meters.
3. Pls. see sheet 1 for other notes.

Legend:

- Inferred boundry between moderately weathered and slight weathered
- Excavation line
- Inferred ground water level
- surface of 1st stage concrete
- section of 1st stage concrete, $f_c=24\text{Mpa}$
- section of 1st stage concrete, $f_c=16\text{Mpa}$
- section of plastic fiber shotcrete

Scale:



REFERENCE DRAWINGS

UT1-C-030-CVL-DG-53001	SURROUNDING ROCK STABILITY CALCULATION OF FLUSHING TUNNEL
UT1-C-030-CVL-DG-51002	EXCAVATION AND SUPPORT DRAWING OF ACCESS TUNNEL FOR D/S GATE OPERATING HOUSE OF DESANDER BASIN
UT1-C-030-CVL-DG-52002	EXCAVATION AND SUPPORT DRAWING OF DESANDER BASIN
UT1-C-030-CUL-DG-52001	LAYOUT DRAWING OF DESANDER BASIN
UT1-C-030-CUL-DG-51001	LAYOUT DRAWING OF ACCESS TUNNEL FOR D/S GATE OPERATING HOUSE OF DESANDER BASIN

SYMBOL AND LEGEND

FOR APPROVAL

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OA	13.AUG., 2021	FIRST ISSUE	WANG H.Q.	ZHANG J.Q.	LI W.G.

PROJECT TITLE

Upper Trishuli-1 HEP (216MW)

OWNER



OWNER'S ENGINEER



CONTRACTOR

DOOSAN Enerbility

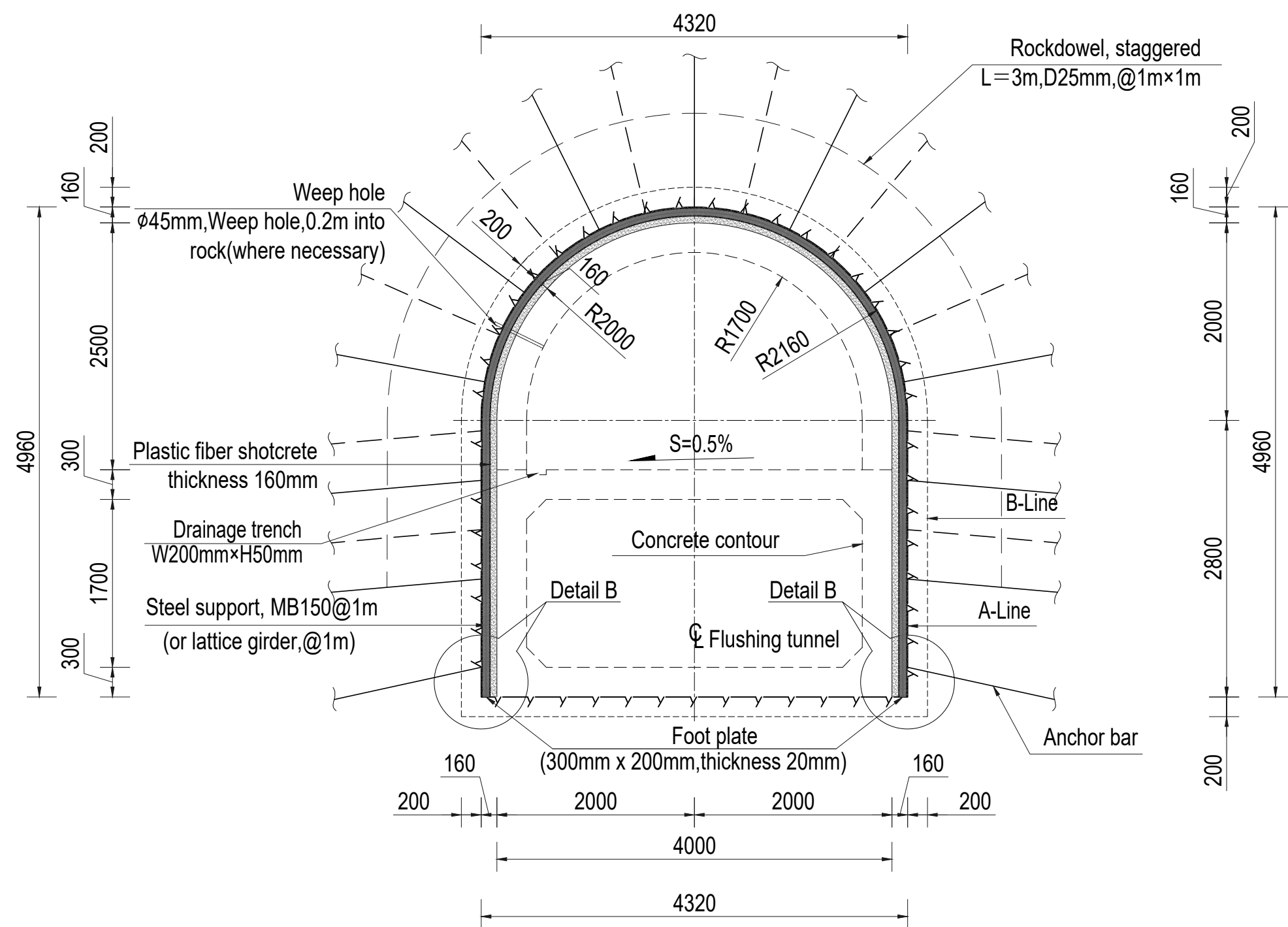
DRAWING TITLE

EXCAVATION AND SURPORT DRAWING OF FLUSHING TUNNEL

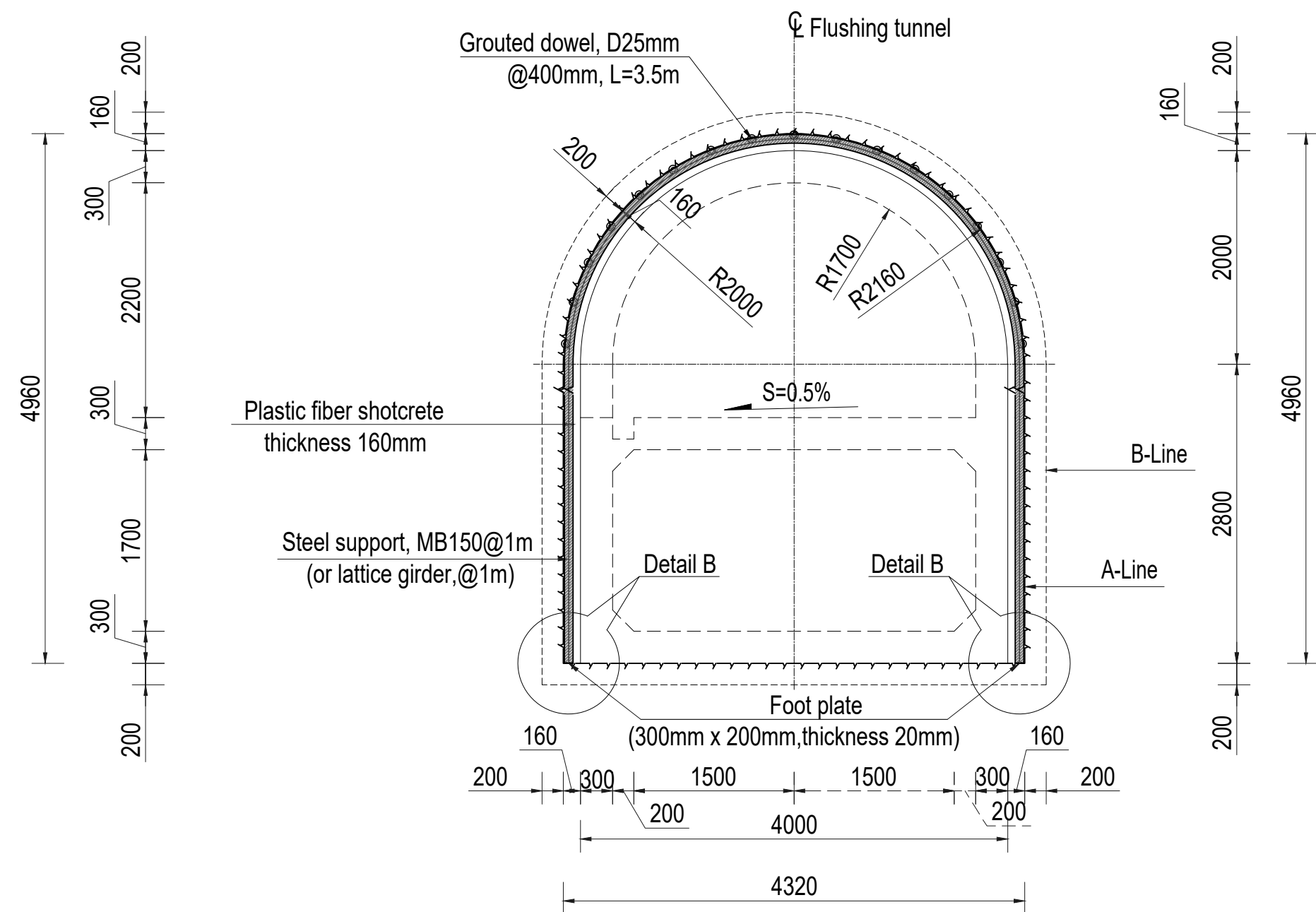
INDEX	DRAWING NUMBER	SHEET NO.	REV. NO.
A	UT1-C-030-CVL-DG-53002-04	4 OF 7	OB

A1 (594 x 841 MM)

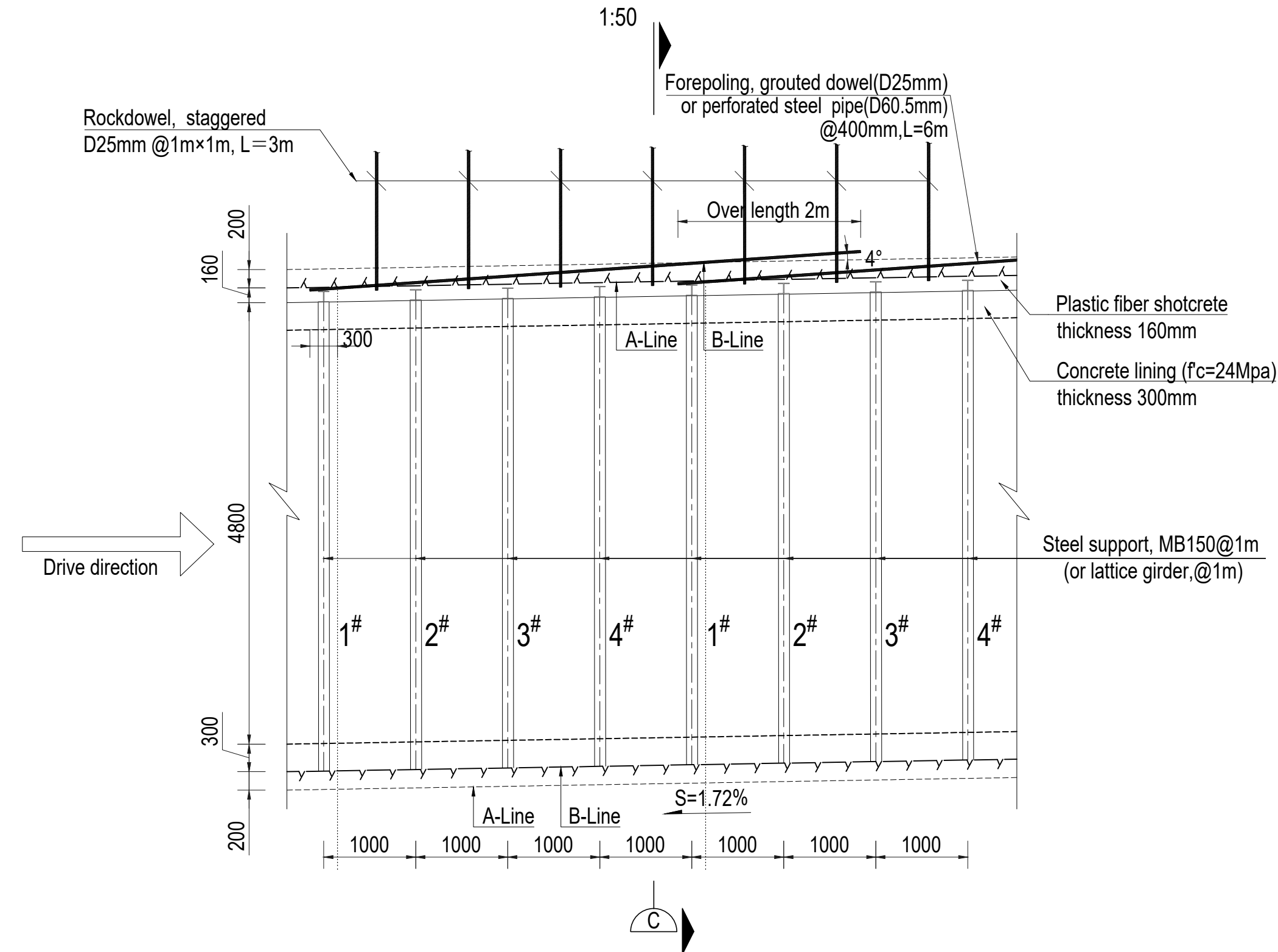
SUPPORT TYPE OF ROCK CLASS IV AND SECTION B-B
(WITH STEEL SUPPORT) 1:50



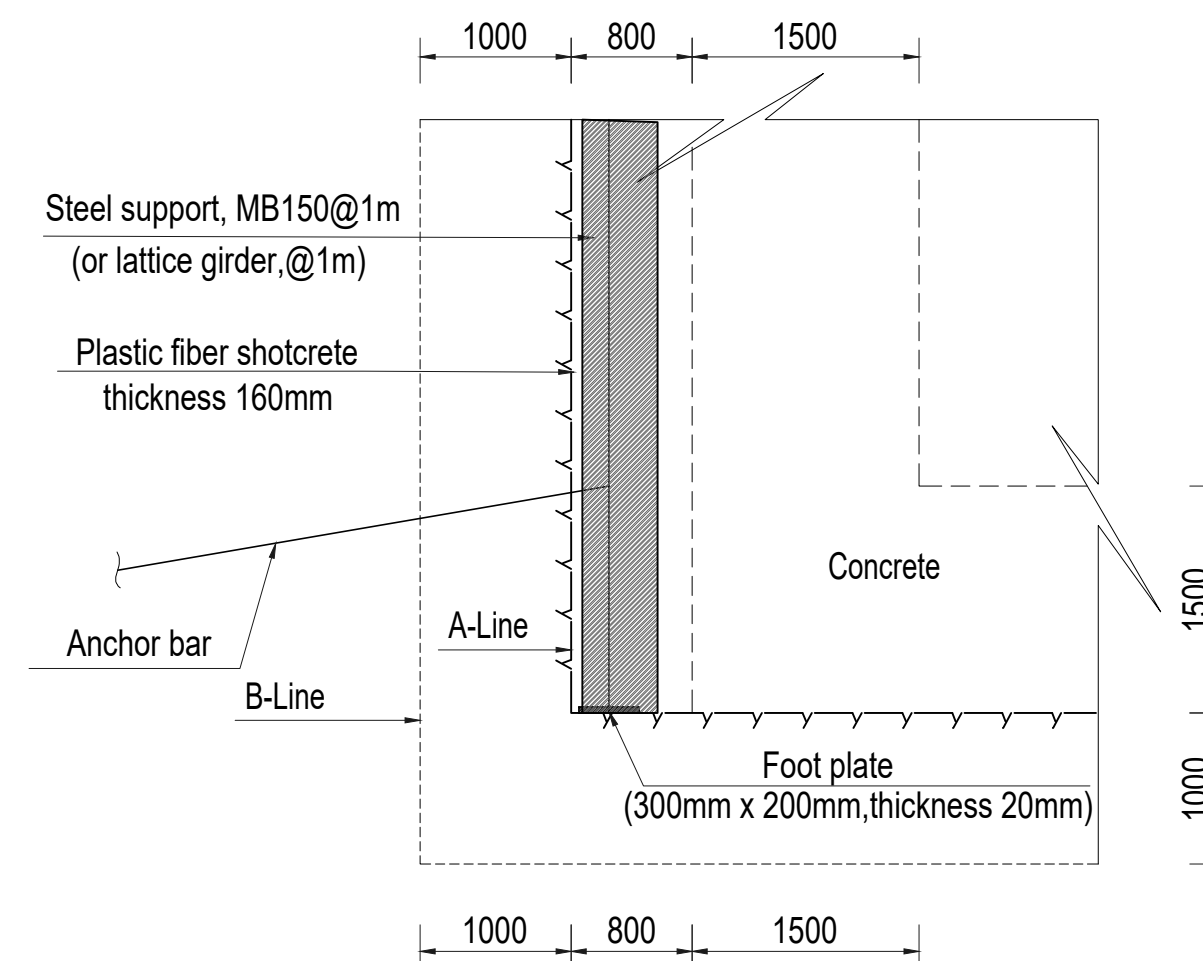
SECTION C-C
1:50



LONGITUDINAL SECTION OF FOREPOLING
1:50



Detail B
1:10



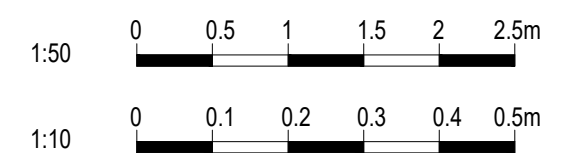
NOTE

1. This set of drawings are the excavation and support of flushing tunnel.
2. All dimensions are in millimeters, and coordinates, chainages & elevations are in meters.
3. Pls. see sheet 1 for other notes.

Legend:

- Inferred boundary between moderately weathered and slight weathered
- Excavation line
- Inferred ground water level
- surface of 1st stage concrete
- section of 1st stage concrete, $f_c=24\text{Mpa}$
- section of 1st stage concrete, $f_c=16\text{Mpa}$
- section of plastic fiber shotcrete

Scale:



REFERENCE DRAWINGS

UT1-C-030-CVL-DG-53001	SURROUNDING ROCK STABILITY CALCULATION OF FLUSHING TUNNEL
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UT1-C-030-CVL-DG-52002	EXCAVATION AND SUPPORT DRAWING OF DESANDER BASIN
UT1-C-030-CUL-DG-52001	LAYOUT DRAWING OF DESANDER BASIN
UT1-C-030-CUL-DG-51001	LAYOUT DRAWING OF ACCESS TUNNEL FOR D/S GATE OPERATING HOUSE OF DESANDER BASIN

SYMBOL AND LEGEND

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OA	13.AUG., 2021	FIRST ISSUE	WANG H.Q.	ZHANG J.Q.	LI W.G.

PROJECT TITLE

Upper Trishuli-1 HEP (216MW)

OWNER



OWNER'S ENGINEER



CONTRACTOR

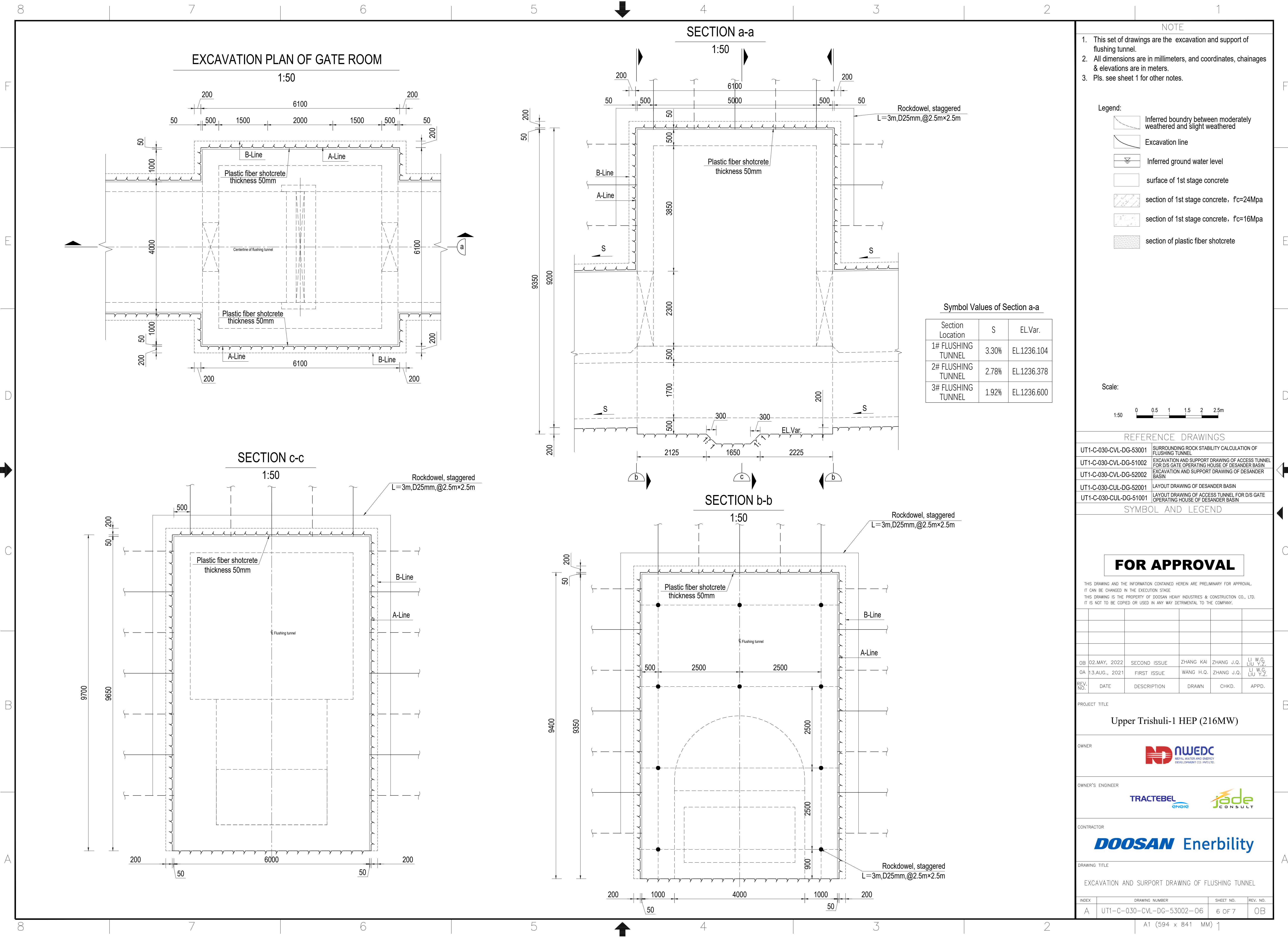
DOOSAN Enerbility

DRAWING TITLE

EXCAVATION AND SUPPORT DRAWING OF FLUSHING TUNNEL

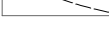
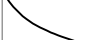
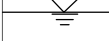
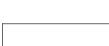
INDEX	DRAWING NUMBER	SHEET NO.	REV. NO.
A	UT1-C-030-CVL-DG-53002-05	5 OF 7	OB

A1 (594 x 841 MM) 1



1:50



- | | |
|---|---|
|  | Inferred boundary between moderately weathered and slight weathered |
|  | Excavation line |
|  | Inferred ground water level |
|  | surface of 1st stage concrete |
|  | section of 1st stage concrete, $f_c=24\text{Mpa}$ |
|  | section of 1st stage concrete, $f_c=16\text{Mpa}$ |
|  | section of plastic fiber shotcrete |

Scale:



REFERENCE DRAWINGS

UT1-C-030-CVL-DG-53001	SURROUNDING ROCK STABILITY CALCULATION OF FLUSHING TUNNEL
UT1-C-030-CVL-DG-51002	EXCAVATION AND SUPPORT DRAWING OF ACCESS TUNNEL FOR DIS GATE OPERATING HOUSE OF DESANDER BASIN
UT1-C-030-CVL-DG-52002	EXCAVATION AND SUPPORT DRAWING OF DESANDER BASIN
UT1-C-030-CUL-DG-52001	LAYOUT DRAWING OF DESANDER BASIN
UT1-C-030-CUL-DG-51001	LAYOUT DRAWING OF ACCESS TUNNEL FOR DIS GATE OPERATING HOUSE OF DESANDER BASIN

SYMBOL AND LEGEND

FOR APPROVAL

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REV. NO.	DATE	DESCRIPTION	DRAWN	CHKD.	APPD.

PROJECT TITLE

Upper Trishuli-1 HEP (216MW)

OWNER



OWNER'S ENGINEER



CONTRACTOR

DOOSAN Enerbility

DRAWING TITLE

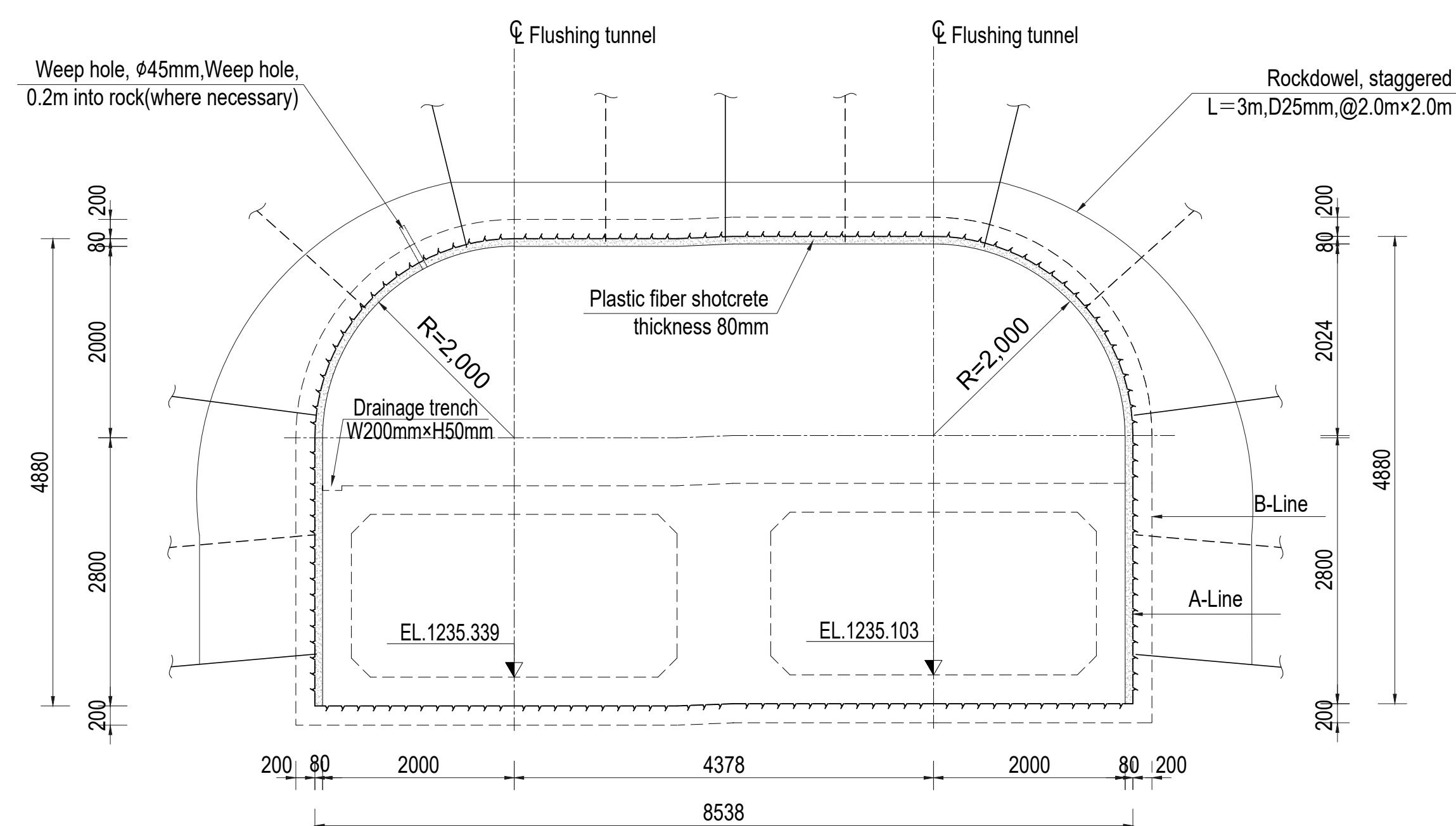
EXCAVATION AND SURPORT DRAWING OF FLUSHING TUNNEL

INDEX	DRAWING NUMBER	SHEET NO.	REV. NO.
A	UT1-C-030-CVL-DG-53002-07	7 OF 7	01

A1 (594 x 841 MM)	1
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SECTION D-D

1:50



Detail 1

1:10

